

ABSTRACT

A semiconductor device manufacturing method by which a process chamber can be self-cleaned, while keeping a temperature in the process chamber low or a semiconductor device manufacturing method by which a high-k film adhering in the process chamber can be effectively removed. The method is provided with a pre-coat process, a film forming process and a cleaning process. Activated F^* or Cl^* by remote plasma passes through a high-k film (31), reacts to a pre-coat film (30) composed of SiO_2 or Si. Since the pre-coat film (30) peels in pieces, the high-k film over the pre-coat film can be removed together.